



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

## NOTICE OF ALLOWANCE AND FEE(S) DUE

7590

02/17/2010

Kevin D McCarthy  
Roach Brown McCarthy & Gruber  
1620 Liberty Building  
Buffalo, NY 14202

EXAMINER

HU, HENRY S

ART UNIT

PAPER NUMBER

1796

DATE MAILED: 02/17/2010

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,321	05/09/2005	Yoram Oren	0-04-204	9122

TITLE OF INVENTION: HIGHLY CONDUCTIVE ORDERED ION EXCHANGE MEMBRANES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$755	\$300	\$0	\$1055	05/17/2010

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

## HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER:** Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

# **PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to:** **Mail** **Mail Stop ISSUE FEE**  
**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, Virginia 22313-1450**  
**or Fax** **(571)-273-2885**

**INSTRUCTIONS:** This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

7590 02/17/2010

Kevin D McCarthy  
 Roach Brown McCarthy & Gruber  
 1620 Liberty Building  
 Buffalo, NY 14202

## **Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/519,321	05/09/2005	Yoram Oren	0-04-204	9122

TITLE OF INVENTION: HIGHLY CONDUCTIVE ORDERED ION EXCHANGE MEMBRANES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$755	\$300	\$0	\$1055	05/17/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
HU, HENRY S	1796	429-033000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.  
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a **Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_  
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_  
 3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY AND STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee  
☐ Publication Fee (No small entity discount permitted)  
☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.  
☐ Payment by credit card. Form PTO-2038 is attached.  
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_ Date \_\_\_\_\_  
 Typed or printed name \_\_\_\_\_ Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/519,321

05/09/2005

Yoram Oren

0-04-204

9122

7590

02/17/2010

Kevin D McCarthy  
Roach Brown McCarthy & Gruber  
1620 Liberty Building  
Buffalo, NY 14202

EXAMINER

HU, HENRY S

ART UNIT

PAPER NUMBER

1796

DATE MAILED: 02/17/2010

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 861 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 861 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

# Notice of Allowability

## Application No.

10/519,321

## Examiner

HENRY S. HU

## Applicant(s)

OREN ET AL.

## Art Unit

1796

### - The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to December 15, 2009.
2. ☒ The allowed claim(s) is/are 1-17, 22-31, 37 and 38.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

### THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

## Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_.

### EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with **Attorney Kevin D. McCarthy** (reg. # 35,278, tel. 716 852-0400) on **January 28, 2010** to cancel non-elected Claims 32-36 as following:

#### **Claim**

**Claims 32-36** please cancel Claims 32-36

### DETAILED ACTION

2. This Office Action is in response to **Amendment** filed on December 15, 2009, which is in response to Non-Final office action of June 23, 2009. With such an amendment along with above Examiner's Amendment, **Claims 1, 6-7, 10, 13, 22, 28-31 and 37 are amended; Claims 18-21 and non-elected Claims 32-36 (Groups II-V) are cancelled, while no new claim is added.** To be specific, parent **Claim 1** is now "once-amended" in at least **four** ways

Art Unit: 1796

including: (A) to incorporate the limitation from original Claims 18-21 into step c so that “**amounts** of said particles or said polymers are 20 to 40 wt%”, (B) **electric field intensity** is 50-20,000 V/cm in step c, (C) the resulting membrane **thickness** is 10-500 microns, and (D) some cosmetic corrections. Dependent **Claims 18-21** is cancelled accordingly.

The use of Examiner's Amendment is only to cancel non-elected **Claims 32-36** (Groups II-V). Examiner now **accepts Applicants' seven drawing sheets with Figures 1-6** since a brief description has been found on page 11. No **IDS** is filed. **Claims 1-17, 22-31 and 37-38** with only **one** independent claim (**Claim 1**) are now pending. An action follows. (No international search report is found in Applicants' **WO 2004/005380 A1**)

3. Claim rejections under **Non-Final** Office Action filed on June 23, 2009 are now removed for the reasons given in paragraphs 4-13 thereafter.

***Allowable Subject Matter***

4. Claims 1-17, 22-31 and 37-38 are allowed.

5. The following is an examiner's statement of reasons for allowance: The above Claims 1-17, 22-31 and 37-38 are allowed over the closest references:

Art Unit: 1796

6. The limitation of “**once-amended**” parent **Claim 1** in present invention relates to **a process for producing ion exchange membranes**, which comprises the **six** steps of:

(a) **providing a matrix material, comprising a polymeric component chosen from the group consisting of monomeric and oligomeric polymer precursors and cross-linkable polymers;**

(b) **introducing in said matrix ion cation or anion exchange particles, or proton or hydroxyl or ion conducting particles or any combination thereof; or cation or anion exchange polymers, or proton or hydroxyl or ion conducting polymers, or any combination thereof;**

(c) **mixing said particles or dissolving said polymer of step (b) with said matrix, wherein said particles or said polymers are used in amounts from 20 to 40 wt% of the combined amount of said matrix, and said particles or polymers;**

(d) **forming the resulting mixture into membrane configuration;**

(e) **ordering by an electric field said particles or ordering by an electric field the domains of said polymer formed by polymer-matrix phase separation upon solvent evaporation or cooling, wherein said electric field has intensity from 50 to 20,000 V/cm; and**

(f) **if said matrix comprises or consists of a polymer precursor or a cross-linkable polymer, said precursor is cured concurrently with said ordering of said particles, or if the matrix comprises a polymer solution or polymer melt the said polymer solution is evaporated or the said polymer melt is maintained and then cooled concurrently with said ordering of said particles;**

*wherein the resulting membrane thickness is between 10 to 500 microns.*

*See other limitations of dependent **Claims 2-17, 22-31 and 37-38.***

7. Regarding “the six-step (a)-(f) process of preparing ion exchange membrane so as to achieve aligned nanostructure” limitation of parent **Claim 1**, it is fundamentally achieved by first mixing an ion-exchange polymer in a polymer matrix, then applying electric field, and finally crosslinking or drying so as to obtain the free standing membrane.

8. With current amendment on parent Claim 1, three important features are added. For instance, (A) to incorporate the limitation from original Claims 18-21 into step c so that “**amounts** of said particles or said polymers are 20 to 40 wt%”, (B) **electric field intensity** is 50-20,000 V/cm in step e, and (C) the resulting membrane **thickness** is 10-500 microns. As exactly pointed out by Applicants in page 1 at bottom to page 2 at top of Remarks, these three features are indeed distinguished over the membranes made by the prior art references including **Martin, Aikman and Young** in view of **Roberts, Morkved and Takaoka** for overcoming pure 103 rejections (see pages 2-4 of Remarks) as follows:

9. By applying such three features, the membranes are more stable and more conductive than known membranes. Additionally, such obtained membranes have lower swelling rate and higher permselectivity. The key point is that the concentration of said ion exchange particles is used in the amount of **20-40 wt%** so as to achieve higher ion flux and conductivity.



Furthermore, none of the above-mentioned six references mention or suggest the resulting membrane thickness being in the exact range of 10-500 microns.

10. **Three** primary references including **Martin, Aikman and Young** in combination or alone only discloses the preparation of some membranes, coatings or films by **depositing perfluorocarbon type ion-exchange polymers on/within selected supported polymeric substrates**. The ion-exchange polymers can be also obtained by curing its respective precursor, while the whole process is achieved in the form of solution. The whole process fundamentally comprises the mixing, forming film or membrane, curing the precursor, and finally drying so as to obtain article in freestanding form.

11. **With current addition on those three features**, the combination of **three** secondary references including **Roberts, Morkved and Takaoka** cannot fix the deficiency of the primary references. Therefore, all the above-mentioned references, in combination or alone, does not teach or fairly suggest the process limitation of present invention.

12. After further examination and search, the examiner found the following prior art did not teach the claimed limitation:

US 5,082,472 to Mallouk et al., US 4,433,082 to Grot, and US 4,940,525 to Ezzell et al. each only discloses the preparation of some perfluorinated ionomer type “membranes and/or composite membrane”. Said perfluorinated ionomer comprises **two** types monomers including: (A) **48-85 mol%** of tetrafluoroethylene (TFE), and (B) **15-47 mol%** of sulphonyl fluoride-containing monomer such as  $\text{CF}_2=\text{CF}-\text{O}-\text{CF}_2-\text{CF}_2-\text{SO}_2-\text{F}$  or the like. The claimed six-step (a)-(f) process of preparing ion exchange membrane by applying electric field so as to achieve aligned nanostructure” is not disclosed or suggested. With current addition on those three features, the references even in combination cannot disclose or teach the claimed process.

13. As of the date of this office action, the examiner has not located or identified any reference that can be used singularly or in combination with another reference including the above references to render the present invention anticipated or obvious to one of the ordinary skill in the art. Therefore, the independent process **Claim 1** is allowed for the reason listed above. Since the prior art of record fails to teach the present invention, the remaining pending dependent **Claims 2-17, 22-31 and 37-38** are passed to issue.

14. Any inquiry concerning this communication or earlier communication from the examiner should be directed to **Dr. Henry S. Hu** whose telephone number is (571) 272-1103. The examiner can be reached on Monday through Friday from 9:00 AM –5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Vasu Jagannathan, can be reached on (571) 272-1119. The **fax** number for the organization where this application or proceeding is assigned is **(571) 273-8300** for all regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Peter D. Mulcahy/  
Primary Examiner, Art Unit 1796

/Henry S. Hu/  
Examiner, Art Unit 1796

February 13, 2010